

May 13, 1941.

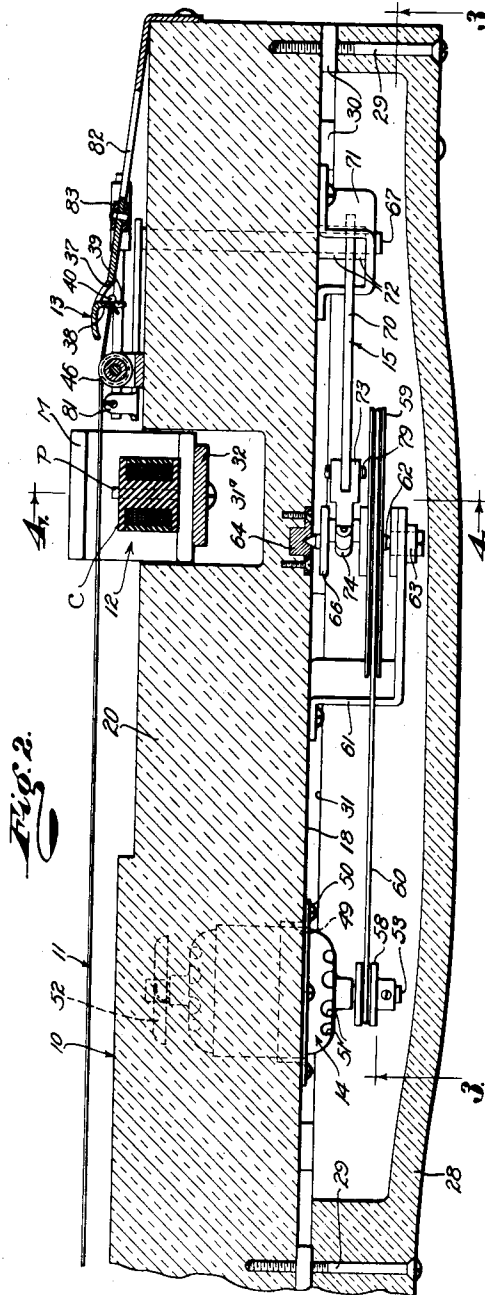
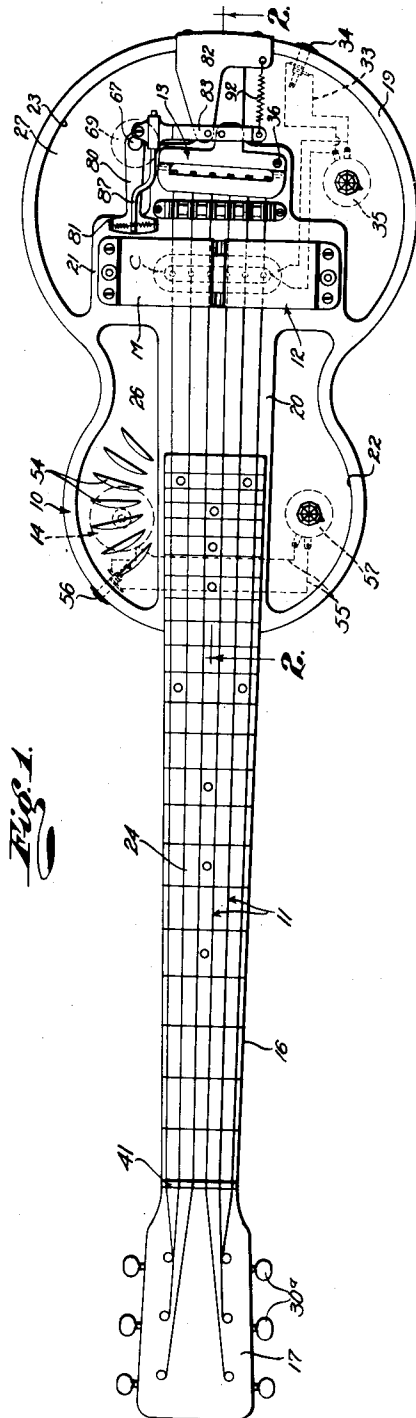
C. O. KAUFFMAN

2,241,911

STRINGED MUSICAL INSTRUMENT

Filed Sept. 26, 1938

3 Sheets-Sheet 1



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STRINGED MUSICAL INSTRUMENT

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3 Sheets-Sheet 2

Fig. 3.

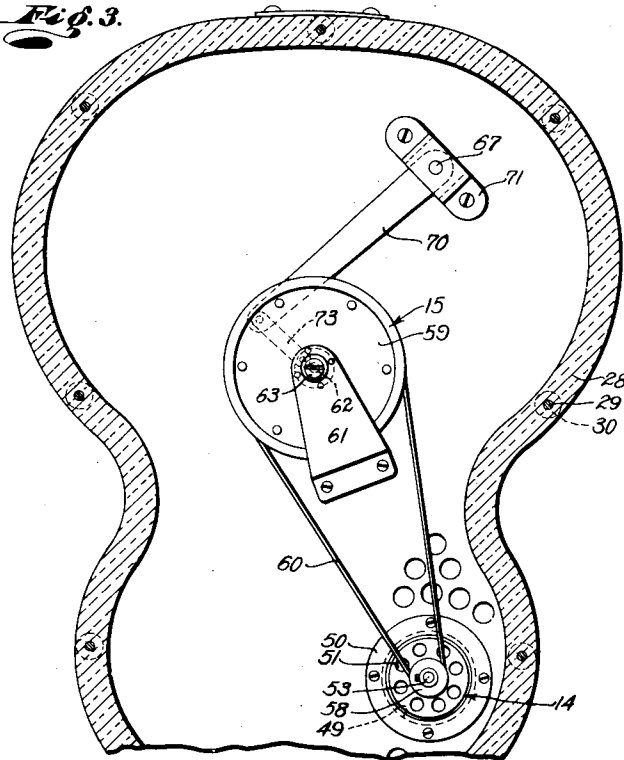


Fig. 4.

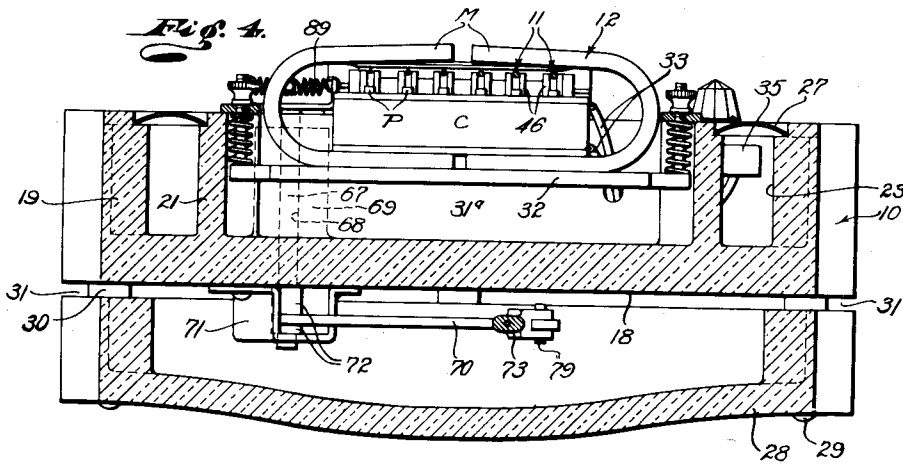
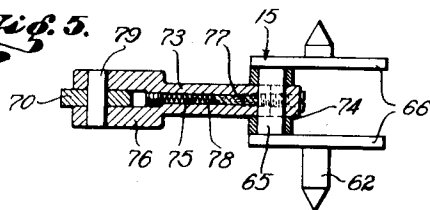


Fig. 5.



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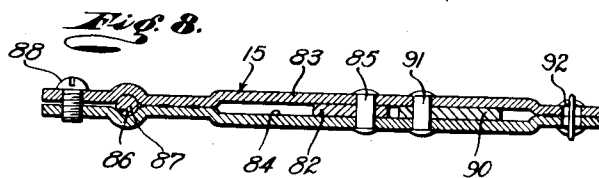
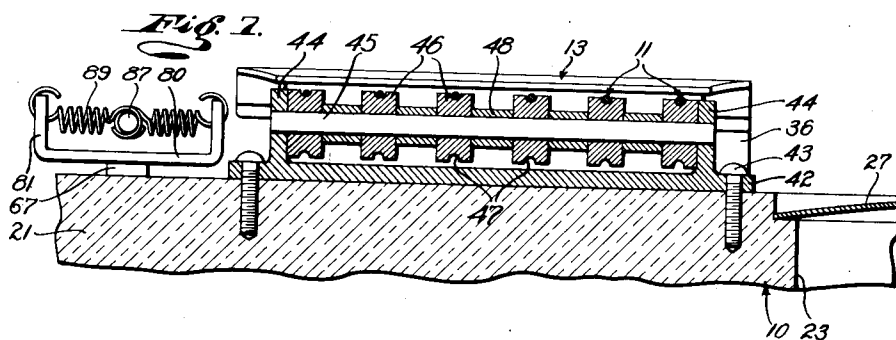
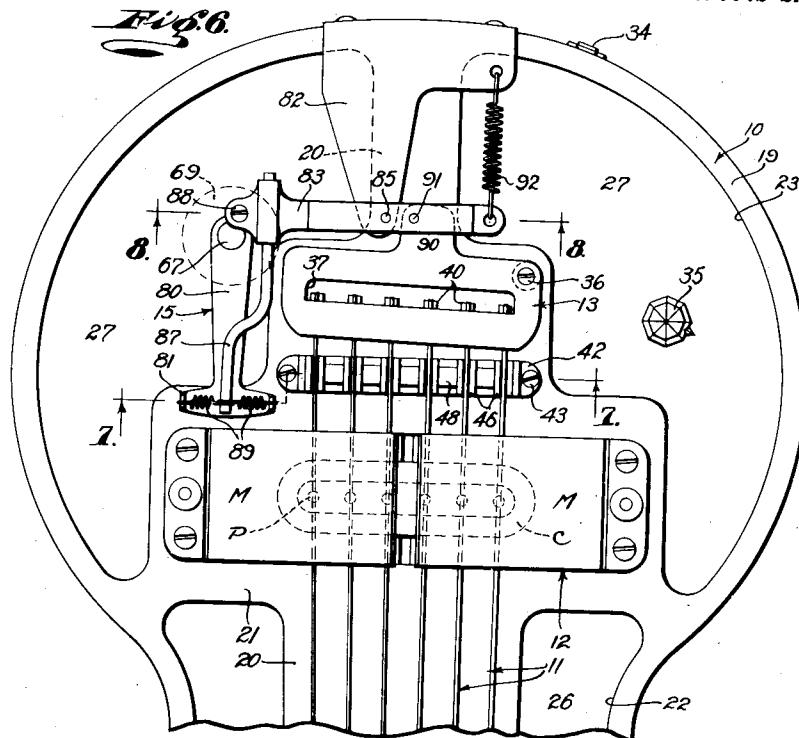
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STRINGED MUSICAL INSTRUMENT

Filed Sept. 26, 1938

3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

2,241,911

STRINGED MUSICAL INSTRUMENT

Clayton O. Kauffman, Fullerton, Calif., assignor
to Electro String Instrument Corporation, a corporation of California

Application September 26, 1938, Serial No. 231,718

6 Claims. (Cl. 84—313)

This invention relates to musical instruments and relates more particularly to a stringed musical instrument embodying novel means for producing a tremolo or vibrato effect. A general object of this invention is to provide a stringed musical instrument embodying a practical effective and improved means for creating a tremolo effect.

Another object of this invention is to provide a musical instrument having vibratile strings and characterized by a mechanism for creating a tremolo effect of constant and regular degree or amplitude and of uniform but readily variable rate.

Another object of this invention is to provide a musical instrument of the character mentioned in which the tremolo producing mechanism is motor driven whereby the musician is not obliged to vibrate his fingers or the steel and is not obliged to operate or manipulate a tremolo producing device.

Another object of this invention is to provide a musical instrument of the character mentioned in which the tremolo producing mechanism operates to continuously vary or fluctuate the tension on the vibratile strings to create the tremolo effect without engaging the strings at points between their ends, without causing rattling of the strings or other parts, without distorting the musical tones and without in any manner interfering with the usual playing of the instrument.

Another object of this invention is to provide an instrument of the character mentioned in which the amplitude or degree of alternate increase and decrease of the tension on the vibratile strings to create the tremolo or vibrato effect is graduated in a given relation to the diameter and normal sustained tension of the strings and, therefore, to the tones of the strings to produce a tremolo effect in which the tremolo of the high strings is more pronounced than that of, or is in the correct relation to that of, the low or base strings.

Another object of this invention is to provide a musical instrument of the character mentioned in which the extent of variation or of alternate increase and decrease of the tension on a given vibratile string is uniform and regular and the rate of the alternation is uniform and regular but readily changed by the simple manipulation of a conveniently accessible handle part on the instrument.

Another object of this invention is to provide an instrument of the character mentioned having a motor driven tremolo producing means that produces little or no mechanical noise and undesirable vibration of the instrument.

Another object of this invention is to provide an instrument of the character mentioned in which the operating motor and a large number

of other elements of the tremolo creating means are housed or contained in the instrument body.

Another object of this invention is to provide an instrument of the character mentioned in which the drive between the operating motor and the oscillating tailpiece of the vibratile strings embodies a novel spring balanced or spring tensioned connection that eliminates knocking and rattling of the connected parts and provides for a smooth movement of the tailpiece at the ends of its strokes or oscillations.

Another object of this invention is to provide an instrument of the character mentioned that embodies a novel anti-friction bridge for the vibratile strings that permits axial movement of the strings when the tension on the same is alternately increased and decreased by the movement of the oscillatory tailpiece.

A further object of this invention is to provide a novel means for cooling the operating motor of the tremolo or vibrato producing means.

The various objects and features of my invention will be fully understood from the following detailed description of a typical preferred form and application of the invention, throughout which description reference is made to the accompanying drawings, in which:

Fig. 1 is a top or plan view of a guitar type instrument embodying the present invention. Fig. 2 is an enlarged fragmentary vertical detailed sectional view taken as indicated by line 2—2 on Fig. 1. Fig. 3 is a slightly reduced fragmentary horizontal detailed sectional view taken substantially as indicated by line 3—3 on Fig. 2. Fig. 4 is a transverse or vertical detailed sectional view taken as indicated by line 4—4 on Fig. 2. Fig. 5 is an enlarged sectional view illustrating the crank and rod elements of the oscillating drive. Fig. 6 is an enlarged fragmentary plan elevation of a portion of the instrument illustrating the pick-up, the oscillatory tailpiece and the adjacent portions of the drive. Fig. 7 is an enlarged fragmentary vertical detailed sectional view taken as indicated by line 7—7 on Fig. 6 and Fig. 8 is an enlarged fragmentary vertical detailed sectional view taken as indicated by line 8—8 on Fig. 6.

The present invention may be embodied in instruments of various types and may be varied somewhat depending upon the character or class of the instrument in which it is incorporated. In the following detailed description I will describe a typical preferred form of the invention embodied in an instrument of the guitar type having an electromagnetic pick-up for converting the vibrations of the instrument strings into an electrical current that may be amplified and converted into sound by a suitable loud speaker unit. It is to be understood that the invention is not to be construed as limited or restricted to the

specific form or application about to be described.

The musical instrument of the present invention illustrated in the drawings includes, generally, a body 10, a series of vibratile strings 11 extending across the upper side of the body 10, an electromagnetic pick-up 12 responsive to vibration of the strings 11 and a mechanism for alternately increasing and decreasing the tension on the vibratile strings 11 to create a tremolo effect comprising a pivoted or oscillatory tailpiece 13 to which ends of strings 11 are secured, a motor 14 in the instrument body 10, a drive 15 between the operating motor 14 and the tailpiece 13 whereby the latter is oscillated at a constant rate and other parts the functions and details of which will be subsequently described.

This instrument body 10 may be varied in design and construction without departing from the invention. The body 10 illustrated in the drawings may be formed of "Bakelite" or similar material and has the general configuration of a typical guitar. A neck 16 projects from the body 10 and is provided at its outer end with a peg-box portion 17. The body 10 with its neck 16 and portion 17 may be an integral unit. The lower side 18 of the body 10 is preferably flat and the upper side of the body is preferably provided with a plurality of cavities. In the preferred construction illustrated, the upper side of the body 10 has a marginal upstanding rim 19, a longitudinally extending web 20 and a transverse web 21 merging with the web 20. The rim 19 and the webs 20 and 21 define two spaced forward cavities 22 and two spaced rearward cavities 23. A fretted keyboard 24 is provided on the upper side of the web 20 and the neck 16. Suitable plates 26 close the upper sides of the cavities 22 and similar plates 27 close the upper sides of the cavities 23.

A cupped or recessed bottom or plate 28 is secured to the lower side 18 of the body 10 to cover or contain certain elements of the drive 15, etc. The plate 28 may be formed of the same material as the body 10 and may be secured to the body by suitable screws 29. The plate 28 is arranged with its relieved or recessed side facing upwardly in opposition to the lower side 18 of the body 10. In accordance with the invention the interior of the recessed plate 28 is vented to the atmosphere. Spacers 30 of non-vibratile material are held between the lower side 18 of the body 10 and the upper side or edge of the recessed plate 28 and are spaced apart to leave a multiplicity of air vents 31 which communicate with the interior of the plate. The screws 29 may serve to hold the spacers 30 in place.

The strings 11 are the vibratile elements of the instrument and are adapted to be plucked or otherwise vibrated by the musician to produce musical tones or to disturb the normal fixed field of the pick-up unit 12 to induce or create an electrical current which may be converted into sound truly representative of the tonal vibrations of the strings. The strings 11 are arranged longitudinally across the upper side of the finger-board 24 and the web 20 in spaced relation thereto. The outer ends of the strings 11 are held by the usual tensioning and tuning pegs 30^a on the box portion 17. The inner ends of the strings 11 are secured to the tailpiece 13 and bear on a bridge means as will be hereinafter described. The strings 11 are arranged in spaced relation in a substantially horizontal series. In accord-

ance with the usual practice the strings 11 are graduated in diameter and those of small diameter may be formed of steel, while those of larger diameter may be wrapped strings. Where the pick-up 12 is employed the strings 11 are formed of or carry magnetic material.

The pick-up 12 is an electromagnetic device responsive to or actuated by the tone producing vibrations of the strings 11 to generate a modulated electric current that may be amplified and converted into sound by a loud speaker unit. The pick-up 12 is preferably of the character described and claimed in Letters Patent No. 2,089,171, granted August 10, 1937, to George W. Beauchamp. The pick-up 12 is an elongate assembly arranged in a pocket or opening 31^a in the transverse web 21 to extend transversely below the series of tensioned strings 11. The present invention is not primarily concerned with the details of the pick-up 12 and I will only briefly describe the principal elements of the pick-up.

The pick-up 12 includes a pair of permanent magnets M of U-shape arranged in reclining positions in the opening 31^a to have their like poles in spaced opposition and to have their outer arms extend across the series of strings 11 in spaced relation thereto. An induction coil C is supported on the lower arms of the magnets M to be in the magnetic field and to be spaced below the strings 11. Pole pieces P project from the upper side of the coil C to have their upper ends in spaced adjacent relation to the strings 11 so that the strings pass through concentrated non-uniform portions of the magnetic field. A suitable adjustable bracket 32 may support the pick-up 12 in its opening 31^a. Vibration of the strings 11 in the concentrated non-uniform portions of the field of the magnets M alters the fixed condition of the field and this alteration or variation induces a current in the coil C.

Leads or conductors 33 extend from the terminals of the coil C to a jack 34 on the body rim 19 so that the current induced in the coil C may be imposed on the amplifying circuit of a loud speaker when a plug of the loud speaker unit is inserted in the jack 34. A rheostat or control 35 may be interposed in one of the conductors 33 and may be positioned in one of the cavities 23 to have its operating knob conveniently accessible at the upper side of the plate 27 closing the said cavity. The current induced in the coil C by vibration of the strings 11 has characteristics directly proportional to the tonal producing vibrations of the strings so that a loud speaker unit associated with the pick-up 12 produces musical tones truly representative of the tonal vibrations of the strings 11.

The tremolo or vibrato producing mechanism of the instrument is an important feature of the invention. This mechanism is operable to continuously increase and decrease the tension on the strings 11 at a constant but variable rate and within a substantially uniform range to create a tremolo effect on the musical tones produced by the strings 11 or produced by the above-mentioned loud speaker as governed by vibration of the strings 11. The tremolo producing mechanism is power driven and may be operated continuously when the instrument is played or in use.

The pivoted or oscillatable tailpiece 13 constitutes an important element of the tremolo creating mechanism. The tailpiece 13 is arranged at the upper side of the body 10 in spaced generally parallel relation to the pick-up 12 and in substantially transverse relation to the strings 11.

In practice the tailpiece 13 is spaced above the web 21 and is supported by a suitable pivot pin 36. The pin 36 is secured in an opening in the web 21 and projects from its upper side to pivotally carry the tailpiece 13. The tailpiece 13 has an elongate opening 37 extending transversely of the strings 11 and has a depending flange 38 extending along the forward edge of the opening 37. Spaced notches 39 are provided in the depending flange 38 and end portions of the strings 11 are received in the spaced notches 39. The knobs or spools 40 on the ends of the strings 11 cooperate with the flange 38 at the notches 39 to anchor or secure the strings 11 to the tailpiece 13.

It is a feature of the invention that the axis of pivotal or oscillatory movement of the tailpiece 13 is related to the series of vibratile strings 11 in such a manner that pivoting or oscillation of the tailpiece effects a maximum change or variation in the tension of the lightest or highest string 11 and a minimum change in the variation of the tension on the heaviest or lowest string 11. The pivot pin 36 pivotally supporting the tailpiece 13 is located at a point spaced longitudinally from and slightly laterally from the adjacent end of the lowest or heaviest vibratile string 11. In practice the pin 36 constituting the axis of pivotal movement of the tailpiece 13 is in close relation to the end of the said heavy string 11. With the pivotal axis of the tailpiece 13 located as just described oscillation of the tailpiece results in relatively slight variation in tension on the heaviest string 11 having a normal or sustained low tension and a relatively great variation in the tension on the highest or lightest string 11 having a substantial sustained normal tension and in variation in the tension on the intermediate strings 11 in proportion to their distance from the axis of the tailpiece and in proportion to their diameters and normal sustained tensions.

The vibratile strings 11 bear on a relatively stationary bridge on the body 10 and a stationary bridge 41 at the outer end of the neck 16 to have the usual elongate tone producing portions. The bridge on the body 10 is preferably such that the strings 11 may have free axial movement when they are alternately stretched and permitted to contract due to the oscillation of the tailpiece 13. The bridge on the instrument body 10 is supported on the upper side of the web 21 and comprises a base or bracket 42 secured to the web by screws 43. Two spaced upwardly projecting lugs 44 are provided on the bracket 42 and a stationary rod or shaft 45 extends between and is supported on the lugs 44. In practice the end portions of the shaft 45 may be secured in openings in the lugs 44. The shaft 45 extends transversely of the series of strings 11 and is spaced below the strings. Rollers or pulleys 46 are rotatable on the shaft 45. Each pulley 46 is provided with a peripheral groove 47 in which a string 11 bears. Rollers or spacers 48 are provided on the shaft 45 between the adjacent pulleys 46 to maintain the pulleys in the proper spaced relation. The rotatable rollers 43 elevate or support the strings 11 for free axial movement when their tension is alternately increased and decreased by operation of the tailpiece 13. Accordingly, the tremolo creating oscillation of the tailpiece 13 may influence or affect the tone producing major portions of the tensioned strings 11. If desired, the string supporting pulleys 46 forming the bridge for the

strings 11 may be supported on the shaft 45 through suitable anti-friction bearings. The points of connection of the strings 11 with the tailpiece 13 are in a plane below the plane occupied by the points of engagement of the strings with the pulleys 46 so that the tensioned strings bear downwardly on the pulleys 46 with substantial force to eliminate or prevent rattling and vibrating of the strings where they contact the pulleys.

The motor 14 is the operating or driving element of the tremolo creating mechanism. The motor 14 is preferably an electric motor of the desired horse power rating. In accordance with the invention the motor 14 is housed or contained in the instrument body 10. An opening 49 may be provided in the lower wall of the body 10 to communicate with one of the cavities 22 and to communicate with the interior of the recessed plate 28. The motor 14 is arranged in the opening 49 and has a supporting bracket 50 which is secured to the lower side 18 of the body 10. The motor 14 is preferably of the ventilated type having breathing openings 51 in its opposite ends. A fan 52 is secured to the upper end portion of the motor shaft 53. Breather louvers or slots 54 are provided in the plate 26 above the fan 52 and the motor 14. The fan 52 is operable to create a current of air for cooling the motor 14. Air is adapted to circulate through the slots 54, the cavity 22, the housing of the motor 14, the interior of the recessed plate 28 and the vents 31 to assure the proper cooling of the motor. The motor 14 may be arranged in a vertical position as shown to have its shaft 53 projecting downwardly into the recessed plate 28. The power leads 55 for the motor 14 extend to a jack 56 on the side of the instrument body 10. A rheostat 57 is preferably connected in one of the leads 55 and has its operating knob accessible to the upper side of the body 10 whereby the speed of operation of the motor 14 may be varied as desired.

The drive 15 between the motor 14 and the tailpiece 13 is operable by the motor to impart oscillatory movement or vibratory motion to the tailpiece. The drive 15 includes a pulley 58 fixed to the projecting lower portion of the motor shaft 53, a rotatable wheel or pulley 59 within the recessed plate 28, and a belt 60 operating over the pulleys 58 and 59. A bearing bracket 61 is secured to the lower side 18 of the body 10 and the shaft 62, to which the pulley 59 is fixed, has one end rotatable in a bearing 63 carried by the bracket. A hardened bearing 64 is inset in the lower side 18 of the body 10 in alignment with the bearing 63, and the shaft 62 has its upper end rotatably supported in the bearing 64. An eccentric or crank 65 is formed on or provided on the shaft 62. In practice the crank 65 may extend between and connect two discs 66 fixed to spaced portions of the shaft 62.

The drive 15 further includes an oscillatable shaft 67 extending through a vertical opening 68 in the instrument body 10. The shaft carrying opening 68 may extend through a suitable boss 69 projecting upwardly from the bottom wall of one of the cavities 23. The shaft 67 extends completely through the opening 68 to have its upper end project above the upper side of the body 10 and to have a portion projecting downwardly into the recessed plate 28. A link 70 is fixed to the projecting lower portion of the shaft 67. A suitable bracket 71 is secured to the lower side 18 of the body 10 and the lower

portion of the shaft 67 is rotatable in an opening in the bracket. Spacers 72 on the shaft 67 space the link 70 from the lower side 13 of the body and the bracket 71.

A connecting rod 73 operatively connects the crank 65 and the link 70. The connecting rod 73 has a split bearing 74 engaging on the crank 65. In accordance with the invention the split bearing 74 is self-lubricating and has means that compensate for its wear so that it will not develop play and will not produce knocks. A longitudinal opening 75 is provided in the connecting rod 73 and a wick 77 saturated with lubricant is arranged in the opening. A spring 78 is arranged under compression in the opening 75 to urge the saturated wick 77 outwardly against the crank 65. The spring urged wick 77 carrying the lubricant is maintained in engagement with the crank 65 to lubricate the crank and the bearing 74 and is fed outwardly against the crank as the parts wear to prevent knocking and rattling of the worn parts.

The end of the connecting rod 73 most remote from the crank 65 is yoked to receive an end portion of the link 70 and a pivot pin 79 passes through openings in the yoked end of the rod and the link 70 to pivotally connect the connecting rod and the link. It is believed that it will be apparent how the crank shaft 62 is rotated by the motor 14 through the medium of the belt and pulley drive 53—59—60 and how the shaft 67 is oscillated or alternately turned in opposite directions by the action of the crank 65 on the connecting rod 73, which is pivotally connected with the link 70.

The drive 15 further includes a movement transmitting mechanism at the upper side of the instrument body 10 for transmitting oscillatory movement from the shaft 67 to the tailpiece 13. This mechanism includes a lever 80 fixed to the projecting upper portion of the shaft 67. The lever 80 is provided at its outer end with two spaced upwardly projecting fingers 81. A tailpiece bracket 82 is rigidly fixed to the rim 19 of the body 10 and projects inwardly or forwardly over the body toward the tailpiece 13. The bracket 82 carries a pivoted lever 83. The lever 83 may be formed of two welded together strips shaped to form or leave a longitudinal slot 84. The forward or inner portion of the bracket 82 is received in the slot 84 and a pin 85 passes through openings in the bracket 82 and the lever 83 to pivotally secure the lever to the bracket. One end of the lever 83 is split and provided with a transverse opening 86. A rod or lever extension 87 has one end portion received in the opening 86 and a screw 88 clamps the split portions of the lever 83 onto the extension to fix the extension to the lever. The rod or extension 87 projects at substantially right angles to the lever 83 and extends toward the outer end of the above described lever 80. The lever 83 with its extension 87 constitutes a pivoted bell crank. The forward or outer end of the lever extension 87 passes between the fingers 81 of the lever 80 in spaced relation thereto.

A novel spring cushioned or yielding connection is provided between the lever 80 and the extension 87 of the lever 83. Coiled extensible springs 89 connect the fingers 81 with the outer portion of the lever extension 87. A spring 89 extends inwardly from each finger 81 and is secured to the extension 87. The springs 89 are substantially balanced or of equal strength. The springs 89 provide a yielding force-transmitting connection

between the lever 80 and the lever extension 87 to transmit the oscillatory movement between the lever 80 and the lever 83. At the start and finish of each stroke or movement of the lever 80 the springs 89 may yield so that a smooth oscillatory movement is imparted to the lever 83.

The lever 83 is pivotally connected with the tailpiece 13 to oscillate the same. The axis of pivotal connection between the lever 83 and the tailpiece 13 is preferably in adjacent relation to the pivotal axis of the lever 83. In the construction illustrated a tab 90 is provided on the tailpiece 13 and extends into the slot 84 and a pivot pin 91 passes through openings in the tab 90 and the lever 83 to pivotally connect the lever and the tailpiece 13. The pivotal axis of the connection between the tailpiece 13 and the lever 83 is spaced a substantial distance from the pivotal axis of the tailpiece. It is believed that it will be understood how the lever 83 oscillated by the lever 80 through the medium of the springs 89 serves to oscillate the tailpiece 13.

Spring means is preferably provided to maintain the strings 11 under tension and to counteract or counterbalance the force exerted by the tensioned vibratile strings 11 on the tailpiece 13, the lever 83 and the associated mechanism. An extensible coiled spring 92 connects the free end of the lever 83 with the bracket 82. The spring 92 is connected with the lever 83 at a point spaced a substantial distance from the pivotal axis of the lever so that the spring has a substantial mechanical advantage over the force exerted on the lever 83 by the tensioned strings 11. In practice the spring 92 may be of sufficient strength to maintain the tailpiece 13 in a substantially neutral or normal position. The spring 92 acting on the lever 83 has substantially the same action as the resiliency of the tensioned strings 11 and serves to counterbalance this resiliency. Thus the tailpiece 13 and the lever 83 may be said to be spring balanced by the resiliency of the strings 11 and the spring 92. It will be observed that the assembly of the tailpiece 13, the lever 83, the bracket 82 and the spring 92 has the same function as the tailpiece of a typical guitar, namely that of anchoring the ends of the vibratile strings to the instrument body.

During operation or use of the instrument the motor 14 may be in continuous operation and may be controlled to drive the tremolo producing mechanism at the selected rate of speed by regulating the rheostat 57. The vibratile strings 11 may be plucked, strummed or vibrated in any other manner to produce the musical tones or the tonal vibrations that actuate the pick-up 12. The tones thus produced have a throbbing quality due to the action of the above described tremolo producing mechanism. The tremolo effect or throbbing quality of the musical tones is uniform and of constant amplitude but may be varied in rate of speed by regulation of the rheostat 57. It will be observed that the musician is not required to vibrate his fingers or the string engaging steel to bring about the constant throbbing or tremolo effect.

The motor 14 through the medium of the pulleys 48 and 59 and the belt 60 constantly rotates the shaft 62 and its crank 65. The crank 65 acting through the medium of the connecting rod 73 oscillates or swings the lever 70 to and fro. Thus the shaft 67 is constantly oscillated. The lever 80 on the shaft 67 oscillates with the shaft and the springs 89 transmit this oscillation from the lever 80 to the lever 83. As described above the

springs 89 transmit this oscillatory movement in such a manner that the lever 83 does not jerk back and forth but moves smoothly. The pin 91 transmits the oscillatory movement from the lever 83 to the tailpiece 13 and the smooth, regular oscillatory movement of the tailpiece results in the alternate increase and decrease of the tension on the vibratile strings 11.

The pivotal axis of the tailpiece 13 is in close proximity to the adjacent end of the largest diametered base string 11, which string is under a low tension. Accordingly, oscillation of the tailpiece 13 as described above may produce but little change or variation in the tension on the largest diametered string 11. On the other hand, the smallest diametered or the highest pitched string 11 is connected with the tailpiece 13 a substantial distance from its pivotal axis so that oscillation of the tailpiece may produce a substantial variation in the tension on this string. Thus the amount or extent of variation in the tension on the strings 11 is determined by the distances between the points of connection of the strings 11 with the tailpiece 13 and the pivotal axis of the tailpiece. It is to be understood, however, that the tension on the several strings is simultaneously increased and simultaneously decreased during one complete stroke or oscillation of the tailpiece 13. The spring 92 connected with the lever 83 to oppose the action of the resiliency and tension of the strings 11 assists in returning the tailpiece 13 and the lever 83 from the positions where the tension on the strings 11 is at the minimum and thus serves to compensate for or counterbalance the action of the tensioned strings. The bridge pulleys 46 on which the strings 11 bear allow the strings to move axially or to stretch and contract axially when their tensions are alternately increased and decreased, as described above. Accordingly, the oscillating tailpiece 13 imparts its tension varying action to the tone producing portions of the vibratile strings which portions are defined by the bridge pulleys 46 and the bridge 41.

Having described only a typical preferred form and application of my invention, I do not wish to be limited or restricted to the specific form and application herein set forth, but wish to reserve to myself any variations or modifications that may appear to those skilled in the art or fall within the scope of the following claims.

Having described my invention, I claim:

1. A stringed musical instrument including an instrument body, a tailpiece member, means supporting the member on the body for oscillatory movement, a vibratile string stretched across the body and having one end secured to the body and one end secured to the member, and means for oscillating the tailpiece member comprising an operating motor having a rotating shaft, and a drive between the motor shaft and the said member operable to convert rotation of the shaft to oscillatory movement of the member, said drive including two pivoted levers, one connected with the said member, a shaft carrying the other lever, crank means operated by the motor shaft to oscillate the last named shaft, and a spring connection between the levers transmitting oscillation from said other lever to the lever connected with said member.

2. A stringed musical instrument including an

instrument body, a tailpiece member, means supporting the member on the body for oscillatory movement, a vibratile string stretched across the body and having one end secured to the body and one end secured to the member, and means for oscillating the tailpiece member comprising an operating motor having a rotating shaft, and a drive between the motor shaft and the said member operable to convert rotation of the shaft to oscillatory movement of the member, said drive including two pivoted levers, one connected with the said member, a shaft carrying the other lever, crank means operated by the motor shaft to oscillate the last named shaft, and opposed extensible springs connecting the levers to transmit oscillation from said other lever to the lever connected with the member.

3. A stringed musical instrument comprising an instrument body, a tailpiece, a series of spaced tensioned vibratile strings stretched across the body and each having an end anchored to the tailpiece, means pivotally supporting the tailpiece on the body for oscillation axially of the strings, a lever pivotally supported on the body, a pivotal connection between the lever and tailpiece adjacent the pivotal axis of the lever, spring means anchoring the lever to the body and connected with the body at a point spaced a substantial distance from the axis of the lever, and means for oscillating the lever to effect oscillation of the tailpiece.

4. A stringed musical instrument including an instrument body, a tailpiece member, means supporting the member on the body for oscillatory movement, a vibratile string stretched across the body and having one end secured to the body and one end secured to the member, and means for oscillating the tailpiece member including a motor housed in the body and having a rotating shaft, a shaft projecting from the upper side of the body, crank means housed in the body and operated by the motor shaft to oscillate the second named shaft, and means at the upper side of the body for transmitting oscillation from said second named shaft to the tailpiece member.

5. A stringed musical instrument including an instrument body, a tailpiece member, means supporting the member on the body for oscillatory movement, a vibratile string stretched across the body and having one end secured to the body and one end secured to the member, and means for oscillating the tailpiece member including an operating motor housed in the body, and a drive between the motor and tailpiece member, the body having an air duct for circulating cool air for the motor.

6. A stringed musical instrument comprising a body, a tailpiece, a series of spaced vibratile strings each having an end secured to the tailpiece, the tailpiece being disposed substantially transverse of the series of strings, means supporting the tailpiece on the body for oscillation substantially axially of the strings about an axis adjacent one side of the series of strings, spring means connected with the tailpiece to maintain the strings under tension, a motor having a rotating shaft, and a drive between the shaft and tailpiece operable to oscillate the tailpiece to alternately increase and decrease the tension on the strings.

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